

WHAT IS CLAIMED IS:

1. A method of identifying an equalization target for a channel, the method comprising:
  - measuring a goodness metric for a first candidate target by
    - reading data through the channel;
  - measuring the goodness metric for a second candidate target by
    - reading data through the channel; and
  - comparing the measure of the goodness metric of the first candidate target to the measure of the goodness metric of the second candidate target and selecting the target with the better measure of the goodness metric as the equalization target for the channel.
2. The method of claim 1 wherein measuring the goodness metric for the first candidate target comprises:
  - setting the first candidate target in the channel;
  - placing an equalizer in the channel into adaptation mode until the equalizer adapts itself to produce equalized data that approaches the first candidate target;
  - taking the equalizer out of adaptation mode;
  - using the equalizer to form equalized data; and
  - measuring the goodness metric based in part on the equalized data.

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3. The method of claim 2 wherein measuring the goodness metric based in part on the equalized data comprises:
  - performing post-processing on the equalized data to form post-processing data; and
  - measuring the number of parity errors in the post-processing data.
4. The method of claim 1 further comprising modifying the equalization target for the channel to improve the measure of the goodness metric.
5. The method of claim 1 wherein the first candidate target and the second candidate target are constrained to have a spectral null.
6. The method of claim 5 further comprising modifying the equalization target for the channel to improve the measure of the goodness metric.
7. The method of claim 6 wherein modifying the equalization target for the channel comprises changing the equalization target to form a new target that does not have the spectral null.
8. The method of claim 7 wherein modifying the equalization target for the channel comprises sequentially adjusting single terms in the equalization target for the channel.

9. The method of claim 7 wherein modifying the equalization target for the channel comprises increasing all of the terms in the equalization target for the channel at the same time.
10. The method of claim 9 wherein modifying the equalization target for the channel comprises sequentially changing pairs of terms in the equalization target.
11. The method of claim 1 wherein identifying an equalization target for the channel further comprises:
- separately identifying an equalization target for each of a set of heads;
  - counting the number of times each equalization target was identified; and
  - selecting the equalization target that was identified for the most heads as the equalization target for the channel.
12. The method of claim 1 wherein identifying an equalization target further comprises:
- separately identifying an equalization target for each of a set of head/zone pairs;
  - counting the number of times each equalization target was identified; and
  - selecting the equalization target that was identified for the most head/zone pairs as the equalization target for the channel.

13. The method of claim 1 wherein the identified equalization target for the channel is of the form  $(1-D)(4 + 6D + 2D^2 + D^3)$ .
14. A data storage device for reading data from a medium, the data storage device comprising:
- a read head for generating an electrical signal based on data stored on the medium;
  - a read channel coupled to the read head for equalizing the electrical signal based on an equalization target of  $(1-D)(4 + 6D + 2D^2 + D^3)$  to produce an equalized signal and for detecting data in the equalized signal.
15. A method of forming an equalization target for a channel, the method comprising:
- searching through a plurality of candidate equalization targets that satisfy a spectral null constraint to locate an initial equalization target that provides a best goodness measure;
  - and
  - adjusting the initial equalization target so that it no longer satisfies the spectral null constraint.
16. The method of claim 15 wherein adjusting the initial equalization target comprises adjusting the initial equalization target so that the goodness measure is improved.

17. The method of claim 16 wherein adjusting the initial equalization target comprises sequentially adjusting a set of terms in the initial equalization target.

18. The method of claim 15 wherein locating an initial equalization target that provides a best goodness measure comprises locating an equalization target that generates the fewest parity errors in the data produced by the channel.

19. The method of claim 18 wherein locating an equalization target that generates the fewest parity errors comprises determining the number of parity errors produced by the channel using a candidate equalization target using steps comprising:

- reading data within a track on a medium while the head is offset to one side of track center and determining a first number of parity errors produced by the channel;

- reading data within the track on the medium while the head is offset to the other side of track center and determining a second number of parity errors produced by the channel;
- and

- taking into account the first number of parity errors and the second number of parity errors to identify the number of parity errors associated with the candidate equalization target.

20. The method of claim 15 wherein forming an equalization target for a channel further comprises:

for each head in a storage device, separately forming an equalization target;  
counting the number of times each equalization target is formed;  
and  
selecting the target that is formed for the most heads as the equalization target for the channel.

21. The method of claim 15 wherein forming an equalization target for a channel further comprises:

for each head/zone pair in a storage device, separately forming an equalization target;  
counting the number of times each equalization target is formed;  
and  
selecting the target that is formed for the most head/zone pairs as the equalization target for the channel.

22. A method for selecting an equalization target, the method comprising:

selecting a spectral null constraint; and  
a step for selecting the equalization target by at least initially using the spectral null constraint.

23. The method of claim 22 wherein the step for selecting the equalization target comprises selecting an initial equalization target from a plurality of equalization targets that satisfy the spectral null constraint.

24. The method of claim 23 wherein the step for selecting the equalization target further comprises adjusting the initial equalization target so that it no longer satisfies the spectral null constraint.

25. The method of claim 23 wherein adjusting the initial equalization target comprises sequentially altering individual terms in the initial equalization target.